CONCEPT: ALPHA DECAY

- **Alpha Decay** occurs when an _____ nucleus emits an *alpha particle*.
  - □ **Alpha particle**: consists of ___ protons and ___ neutrons; usually symbolized as: $^{4}_{2}$___ or $^{4}_{2}$___
  - □ Typically occurs in _____ nuclei with excess protons and neutrons.
    - Produces a stable Helium atom (He-4).
- When balancing nuclear reactions of any type of radioactivity, must always balance:
  - □ Atomic number (____) and _____ number on both sides.

$$^{171}_{78}\text{Pt} \longrightarrow \underline{\quad} + {}^{4}_{2}\alpha$$

(parent nuclide) (daughter nuclide)

___ + 4 = 171

___ + 2 = 78

EXAMPLE: Write a balanced nuclear reaction for alpha decay of $^{204}_{88}\text{Ra}$.

Characteristics of Alpha Particles

- **Ionizing power** is the ability of an energetic particle to _____ atoms and molecules.
- **Penetrating power** is the ability of an energetic particle to pass through _____.

Types of Radioactivity

Type	Particle	Example	Size	Ionizing Power	Penetrating Power	Shield
Alpha Decay	_____	$^{171}_{78}\text{Pt} \rightarrow {}^{167}_{76}\text{Os} + {}^{4}_{2}\alpha$	_____	_____	_____	_____ _____

- □ Because of high ionizing power, alpha particles are considered the _____ damaging to biological tissues.

EXAMPLE: Select the correct statement about alpha decay.

a) Parent nuclide gains 2 protons and 2 neutrons.

b) Produces radiation by absorbing a helium nucleus.

c) Alpha particles easily penetrate cells.

d) When alpha decay occurs in an unstable atom, the mass # decreases by 4 and atomic # decreases by 2.